Resuscitation
Clinical paper

Early antibiotics improve survival following out-of hospital cardiac arrest☆

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Journal Reading

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Introduction

- The extent and types of post OHCA infection
- The role of antimicrobial therapy in their treatment.
- Retrospective cohort study

Methods- Patient identification

- All patients admitted to ICU following CPR between March 2007 and December 2010 were identified.
- Excluded:
  - In-hospital cardiac arrest
  - Traumatic cardiac arrest
- Therapeutic hypothermia:
  1. 33°C for 24 h
  2. rewarmed 0.25–0.5°C/h
  3. maintained 37°C for 24 h.

TH is thought to reduce secondary neurological injury

- reducing cell metabolic demands (by 5% per 1°C)
- suppresses the pathway of programmed cell death and post-ischaemic inflammation.

Methods- Data Analysis

- Antibiotic use within the first 7 days from admission was treated as a time dependent covariate.
- Survival to 30 days was analysed as the outcome measure.

Results

- Total 260, excluded 122, left 138.
- Mean age: 61.7
- Overall hospital mortality rate: 68.1%
- 38.9% received antibiotics during the first 7 days.
- The mean delay between ICU admission and first dose of antibiotics: 2.17 days.
- Antibiotics used:
  - piperacillin with tazobactam
  - vancomycin
  - amoxicillin with clavulinic acid
  - clarithromycin.

Results

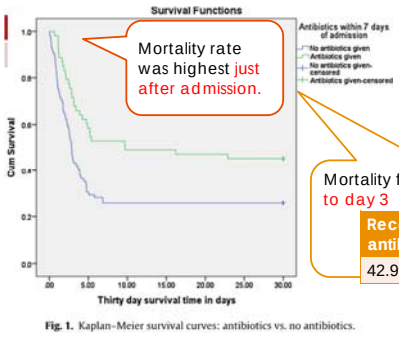
- Markers of infection:
  - Positive microbiology
  - Consolidation on CXR
  - CRP > 100 mg/L
  - WCC < 4 or >11 x10^9 /L

Number of marker	% of patients
At least 1	97.8%
2 and more	73.9%
3 or more	40.6%
All 4 markers	8.0%

- Positive bacterial growth:
  - 46.9% blood samples
  - 68.57% protected catheter respiratory samples

Table 1
Commonest bacterial cultures found.

Bacterial species	Frequency
S. pneumoniae	9/56
H. influenzae	7/56
E. coli	6/56
S. aureus	5/56
Other Streptococci	5/56
K. pneumoniae	4/56
Other Staphylococci	4/56



Mortality rate was highest just after admission.

Mortality for patients survived to day 3

Received antibiotics	No antibiotics
42.9% (9/21)	43.6% (24/55)

Fig. 1. Kaplan–Meier survival curves: antibiotics vs. no antibiotics.

Results

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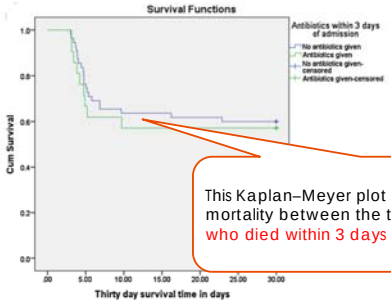
- Mortality rate (p=0.025)

Received antibiotics	No Antibiotics
56.6% (30/53)	75.3% (64/85)



This Kaplan–Meyer plot shows little difference in mortality between the two groups once those who died within 3 days have been excluded.

Fig. 2. Kaplan–Meier survival curves excluding deaths within 72 h.

Results

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Results

- The Cox proportional hazards model with time dependent covariate of antibiotic use produce a hazard ratio for antibiotic use of 1.25.
- Statistically significant risk factors for mortality that are present on admission:
  - ICNARC score (hazard ratio of 1.04 per point on ICNARC score)
  - cooling (hazard ratio of 0.475)
  - VF/VT (hazard ratio 0.391)
  - total downtime (HR 1.016/min extra downtime).

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Discussion

- Previous studies have shown that infections, particularly pneumonia, are common following OHCA.
  - aspiration of oro-pharygeal or gastric contents
  - ventilation with mouth-to-mouth, bag-valve-mask or supra-glottic airway devices
- Patients treated with TH are more likely to develop pneumonia.
  - Temperature control will clearly mask an important early sign of infection, fever, for up to 56 h.

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Discussion

- We are unable to give any estimate of the rate of infections following OHCA in the hospital studied.
- Patients who were started on antibiotics within the first week following OHCA had a significant reduction in mortality
  - antibiotics are treating infection, reducing mortality.
  - antibiotics could be having other beneficial systemic effects:
    - anti-inflammatory
    - inotropic,
    - neuroprotective.

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Discussion

- Limitations:
  - A retrospective cohort study of patients admitted to a single centre over nearly 4 years.
  - No randomisation, no standardisation across groups and potentially incomplete exclusion of confounding factors.
  - Only uncovered a treatment bias for those patients who survive long enough to receive antibiotics.

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Conclusion

- The difficulties in detecting infection in the post-arrest period and asks what strategies are available in the future.
- Antibiotic treatment may have a mortality benefit in these patients and we therefore propose undertaking a randomised controlled trial comparing prophylactic antibiotics with placebo.

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Thanks for your attention